

Highlights

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ATOMIC WASTE DISPOSAL

RESEARCH AND DEVELOPMENT: Investigations are now going forward under Atomic Energy Commission auspices with the objective of converting high-level radioactive wastes into a solid, non-leachable material that can be **stored** indefinitely with "negligible" hazard.

Two general schemes have been under development, according to Dr. J.A. Lieberman, AEC, Washington:

* Conversion of the radioactive liquid wastes to a solid oxide form by heating in some kind of liquid-solid contactor. This approach is being studied at the Idaho Chemical Processing Plant, Argonne National Laboratory and Brookhaven National Laboratory.

* Incorporating the radioactive material either physically or chemically in clays, glasses or synthesized crystal minerals such as feldspars or micas.

Reporting to the Joint Committee on Atomic Energy, Dr. Lieberman declares that both general ideas can "fit together" in that the solid oxide may be used as a starting material in a further fixation system, or the oxide material may be put through a leaching step to remove the soluble radioactivity.

Direct Disposal -- Placing high-level wastes directly into selected geologic formations has been under study for two or three years. AEC reports that laboratory studies at Oak Ridge and the University of Texas indicate the feasibility of direct disposal in underground salt structures. Preliminary design work is directed toward a large-size "cold" field experiment early in 1959.

Optimum Solution? - "At the present time," the Joint Committee was told "it would appear that an optimum solution to the problem of final disposal of highly radioactive liquid wastes would include the conversion of the waste to a solid, preferably inert form and the long-term (essentially permanent) storage of these solids in a specially selected geologic formation such as a salt bed."

Engineering Progress: The Joint Committee was informed that engineering development on liquid-solid systems is farthest advanced at the Idaho Plant, where a fluidized bed technique is being used to convert the liquid wastes to a solid oxide. At Idaho, detailed engineering design of a 60 gallon per hour prototype has been completed. At Brookhaven a preliminary engineering study of a rotary kiln plant and a clay fixation unit has been done.

ATOMIC PROGRESS REPORT: Here, for reference, are some of the highlights of the AEC semiannual report to Congress released Jan. 31.

- * Project Pluto - "Encouraging results" are claimed in research connected with development of a high temperature air cooled reactor for a ramjet which could propel missiles with "essentially unlimited range" within the Earth's atmosphere. Construction is underway on facilities for the testing of Tory II, a small-scale non-flyable reactor connected with this highly classified program.
- * Project Rover - An experimental and non-flying low power reactor known as Kiwi-A has been assembled with nuclear components at the AEC's Nevada Test Site. The test device is part of a program to demonstrate the feasibility of nuclear rockets.
- * Nuclear Aircraft - Investigations continued on a direct cycle approach under study by General Electric and an indirect cycle system at new laboratories of Pratt & Whitney Aircraft Division of United Aircraft. Completion of a shield test air facility is scheduled for June, 1960 at the National Reactor Testing Station, Idaho. Experiments have been conducted at the Idaho Station with a second reactor core using materials with higher performance abilities. (Maj. Gen. Donald J. Keirn, reported last week that "we can proceed into a flight test program with confidence that the parts of the airframe subjected to radiation will function as required during the period of flight test.")
- * Project Plowshare - The next step in the Plowshare program for peaceful use of nuclear explosions may be a test of the power production and isotope production capabilities of contained nuclear explosions. A study has been conducted to determine the feasibility of detonating a 10 kiloton nuclear device in the Salado salt basin about 25 miles southeast of Carlsbad, N. Mex. Commission studies indicate that these massive salt deposits are dry and have proper solubility for such an experiment.

AEC believes that the energy stored as heat might be released in a controlled manner by use of a transfer agent such as water, carbon dioxide or nitrogen, and used industrially or in the production of electric power. The neutrons released by such an explosion could bombard "an appropriate substance" and result in mass production of manmade isotopes. "It appears," the Commission says "that power and isotopes might be produced in this manner less expensively than by other techniques."

- * Atomic Economics: AEC says the Nation's atomic energy industry continues in a pattern of "gradual growth." Private expenditures for fabrication and construction of power reactors are estimated at about \$70 million for the year ending June 30, 1959, compared with \$40 million the previous fiscal year. Total private and Federal "commitments" - civilian and military - for construction of power and propulsion reactors, are estimated at \$400 million, up about \$100 million in a year.

(Report will be available for the public later this month. Watch The Checklist for details.)

JET FUEL SHORTAGES? There is now "growing concern" in the Pentagon as to whether the U.S. refining industry has sufficient operable processing capacity to produce required volumes of high-quality jet fuel under war emergency conditions. C.P. Milne, Deputy Asst. Secy. of Defense, points out that ten years ago the military was consuming 7,000 barrels of jet fuel daily. The current rate is 329,000 barrels per day, with an increase to 400,000 expected in another five years.

Major Problems -- The present and predicted increase in jet fuel requirements is further complicated by several key technical problems. These include:

- * The close acceptable tolerances of jet engines to the minutest particles of rust, dust or even bacteriological contamination.
- * The high thermal stability and low freeze specification limits.
- * The growing requirement for a kerosene type jet fuel with a low freeze point which includes higher viscosity and makes the removal of contamination more difficult.

"Broad planning guides" indicate that in a long drawn out emergency in which supersonic jet aircraft were used extensively the total free world military and civilian jet fuel requirement could increase to between 1.5 and 2 million barrels per day.

SPACE ADMINISTRATION RESEARCH: Members are now being selected for the influential Advisory Committees of the National Aeronautics and Space Administration (NASA). Chairmen have been selected from industry and the universities. Each committee will have a secretary stationed at NASA headquarters. Here, for reference, is the current list:

Fluid Mechanics - Chmn: Prof. William R. Sears, Cornell University;
Secy: E.O. Pearson, Jr.

Aircraft Aerodynamics - Chmn: R. Richard Heppe, Lockheed Aircraft;
Secy: Albert J. Evans.

Missile and Spacecraft Aerodynamics - Chmn: Dr. H. Guyford Stever, M.I.T.;
Secy: Ralph W. May, Jr.

Control, Guidance and Navigation - Chmn: Dr. Louis N. Ridenour, Missile Systems Division, Lockheed Aircraft; Secy: Bernard Maggin.

Chemical Energy Processes: Chmn: James A. Reid, Astrodyne, Inc.
Secy: Harold F. Hipsher.

Nuclear Energy Processes: Chmn: Dr. Walter H. Jordan, Oak Ridge National Laboratory, Union Carbide Nuclear Co.; Secy: David Novik.

Mechanical Power Plant Systems: Chmn: Gordon Banerian, Aero-Jet General;
Secy: William H. Woodward.

Electrical Power Plant Systems: - Chmn: Dr. Krafft A. Ehricke, Convair-Astronautics; Secy: James Lazar.

Structural Loads - Chmn: E.Z. Gray, Boeing Airplane; Secy: R. Fabian Goranson.

Structural Design - Chmn: Prof. E. E. Sechler, California Institute of Technology; Secy: Melvin G. Rosche.

Structural Dynamics - Chmn: Martin Goland, Southwest Research Institute;
Secy: Harvey H. Brown.

Materials - Chmn: R.H. Thielemann, Stanford Research Institute;
Secy: Richard H. Raring.

Aircraft Operating Problems - Chmn: William Littlewood, American Airlines;
Secy: Boyd C. Myers, II.

RAM JET RESEARCH: Investigations supported by the Department of Defense look toward development of new ram-jet engines described as "little more than a simple pipe with no moving parts and no ignition system." According to Dr. Harold A. Beatty, Ethyl Corp., ignition would be accomplished by moving the engine fast enough forward to force required amounts of air into the pipe. The engine would use new pyrophoric fuels which ignite upon contact with oxygen. The engines are said to be under study in connection with drone aircraft, where the cost of a new engine is more important than fuel costs.

NEW ENDFIRE ANTENNA: Investigators at the Naval Research Laboratory have found that the dielectric plate, a new endfire antenna, is capable of yielding desirable radiation characteristics. Endfire arrays of these plates are said to give gains and beamwidths otherwise unobtainable in a given volume. It is reported that the plate arrays show the ability to utilize whatever broadside aperture is available.

(Details from OTS, U.S. Department of Commerce, Washington 25, D.C. Write for PB 131 473. 22 pages 75 cents.)

FREE PISTON ENGINE: Researchers at the University of Michigan say they have demonstrated the feasibility of analog computer simulation of a free-piston engine. The simulation, it is reported, greatly increases the speed at which both steady-state and transient solutions may be obtained, increases the validity of the computation and produces a solution with an accuracy comparable to that with which the values of actual engine, fuel and air parameters are known.

(Report available in limited quantity. Write Engineering Research, University of Michigan, Willow Run Laboratories.)

CHEMICAL RESEARCH: Investigations by the U.S. Agricultural Research Service have led to the conclusion that APO, an organic phosphorous compound, can solve a major discoloration problem in wash-and-wear cotton garments. The compound is said to provide outstanding crease retention and wrinkle resistance, and increased flame resistance. Commercial use awaits increased domestic production since most supplies are not imported.

(Details from Information Office, U.S. Department of Agriculture, Washington 25, D.C.)

SUPERSONIC TRANSPORT: Computer and wind tunnel testing indicates to engineers of Convair Division, General Dynamics Corp. that the commercial market for a Mach 2 passenger plane (capable of flight at twice the speed of sound) will be too small to justify development costs. R.C. Sebold, Convair V.P. says however, that a Mach 3 to 5 transport could be available by 1970 and would be economically justified by an expected operational life of 15 to 20 years or longer.

GEODETTIC MEASUREMENTS: Studies of the orbital flight of the Vanguard test satellite indicate that the earth is "slightly pear shaped" with the narrow end in the Arctic and the broad base in the Antarctic. Space Administration scientists believe their findings contradict the established theory that the Earth is nearly a sphere with a "bulge" around the equator. They also speculate that slow convection currents are now moving through the mantle surrounding the fluid core of the Earth.

DRY CELL RESEARCH: A technique developed at the electrochemistry laboratory of the National Bureau of Standards permits the non-destructive measurement of the true internal resistance of dry cells. Simple experimental equipment and procedures are used and large numbers of cells may be tested quickly. The tests indicate that the internal resistance measurement of a cell might be used to determine its life expectancy. Further investigation is under-way.

(Details available free. Write National Bureau of Standards, Office of Technical Information, Washington 25, D.C. for Summary Tech. Report No. 2298.)

IMPROVED YTTRIUM METAL: Research by the U.S. Bureau of Mines has resulted in the transformation of yttrium metal from its normal brittle state to a pliant, easily formed material which can be cold-rolled into foil. The high-purity yttrium produced by the Bureau in cooperation with the Atomic Energy Commission, contains only about 0.2 percent oxygen, which is the principal element limiting ductility. The metal is now believed to have potential use in atomic reactors and atom-powered missiles.

(Some details available -- Write Information Office, Bureau of Mines, Washington 25, D.C. for Release P.N. 48591.)

NEW PIPE TRANSPORTER: Researchers at the U.S. Army R&D Laboratories, Ft. Belvoir, Va. have developed a new pipe transporter which is said to be capable of speeding liquid fuel supplies to troops in the field. The new transporter uses a hydraulic boom for mechanized pipe stringing. It is claimed that the new technique is three times faster and requires less manpower than present manual methods.

INTERLABORATORY TESTS: The National Bureau of Standards has worked out an interlaboratory test scheme that is said to employ a minimum of mathematical statistics while yielding, in most cases, results that are easy to interpret. The procedure permits analysis of discrepancies between different testing laboratories that presumably use the same test procedure. The method is expected to be useful for coordinating quality-control tests on the same product carried out by laboratories in different plants of the same company.

(Details available free. Write National Bureau of Standards, Office of Technical Information, Washington 25, D.C. for Summary Tech. Rept. No. 2312.)

EDUCATORS SOUGHT: Air Force Institute of Technology is seeking civilian educators who are Reserve Officers not on extended active duty. Requirements are a Ph.D and experience in teaching or related fields in physics, mathematics, mechanical and electrical engineering.

(Qualified officers may inquire by writing the Dean, School of Engineering, HQ Air Force Institute of Technology, Wright-Patterson Air Force Base, Dayton 31, Ohio.)

FIRE RESEARCH: A committee of the National Academy of Sciences has announced publication of a new periodical, Fire Research Abstracts and Reviews, to be issued three times a year.

(Copies available free. Write Committee on Fire Research, National Academy of Sciences, Washington 25, D.C.)

THE CHECKLIST

- () Atomic Energy Legislation, a useful collection of statutes and material pertaining to atomic energy legislation through the years. 230 pages. Free. (Write Joint Committee on Atomic Energy, F-88, The Capitol, Washington 25, D.C.)
- () Next Ten Years in Space, a congressional staff report, now available, consisting of predictions and expectations of 50 foremost space technicians in the U.S., England, Germany, Italy and the Far East. 221 pages. Free. (Write Committee on Astronautics and Space Exploration, New House Office Building, Washington, D.C.)
- () European Nuclear Energy Agency, a report on a 17-nation effort in the atomic energy field including activities of The Eurochemic Company for the chemical processing of irradiated fuels. Annexes include conventions, treaties and a catalog of existing or planned European test reactors, and national programs. 192 pages. \$2. (Write, OEEC Mission, Publications Office, Suite 1223, 1346 Conn. Avenue, N.W. Washington 6, D.C.)
- () Air Pollution, an illustrated presentation just published of the highlights of a national conference on air pollution problems in Washington, Nov. 1958. 42 pages. Free. (Write Information Office, U.S. Public Health Service, Washington 25, D.C. for P.H.S. Publication No. 648.)
- () Pesticides, a list of publications issued by the Government's Pesticide Chemicals Research Laboratories. Of interest to the chemical industry. Free. (Write Entomology Research Div., U.S. Dept. of Agri., Beltsville, Md.)
- () Nuclear Explosions, a literature search on the peaceful uses of such explosions. Prepared at Oak Ridge. 50 cents. (Write OTS, U.S. Dept. of Commerce, Washington 25, D.C. for Report TID-3522.)
- () Research and Development and its impact on the national economy. The Proceedings of a conference sponsored by the National Science Foundation in May, 1958 and now available in printed form. 223 pages. \$1.25. (Write Government Printing Office, Superintendent of Documents, Washington 25, D.C. for Publication NS 1.2:F 96/2.)
- () Atomic Weapon Accidents, a bulletin designed to present unclassified information on safety precautions, potential health hazards, and procedures applicable at the scene of an accident involving atomic weapons. 7 pages. 10 cents. (Write Government Printing Office, Superintendent of Documents for Publication Y 3.At 7:2 Ac2.)
- () Research in Radiology, an edited transcript of an informal conference held in 1957 on radiobiological foundations of modern radiation therapy and other related subjects. 208 pages. \$1.75. (Write National Academy of Sciences, Printing and Publishing Office, 2101 Constitution Avenue, Washington 25, D.C. for Publication No. 571.)
- () Titanium Alloys, an Air Force Sponsored report on pilot production, fabrication and evaluation of promising titanium alloys which were distributed to various jet engine manufacturers. The titanium-aluminum-molybdenum alloys were said to be highly promising for use in compressor blades. 46 pages. \$1.25. (Write OTS, U.S. Department of Commerce, Washington 25, D.C. for PB 131978.)

